

Claims:

1. An activity board assembly including;
 - a board having an upper surface for supporting a user,
 - a base portion and
 - 5 - a resilient support member having an upper and a lower distal end, said upper end being connected to an underside of said board and said lower distal end being connected to said base portion,

characterised in that the board is rotatable with respect to the base portion about;

 - 10 - a first axis in a plane substantially orthogonal with the upper surface of the board and/or the base portion;
 - a second axis substantially orthogonal to said first axis and substantially parallel to the upper surface of the board and/or the base portion;
 - a third axis orthogonal to both the first and second axis; - 15 said connection between the resilient support member and the base portion being configured to prevent linear movement with respect to each other.
2. An activity board assembly as claimed in claim 1, wherein the board is rotatable about said first axis by a rotatable connection between the resilient support member and either the board or the base portion.
 - 20 3. An activity board assembly as claimed in claim 2, wherein said rotatable connection is a bearing or a shaft and rotating member rotatable about said shaft.

4. An activity board assembly as claimed in any of claims 1-3, wherein the board has an elongated configuration with a major or longitudinal axis and a minor or lateral axis.
5. An activity board assembly as claimed in any one of the preceding claims,
5 wherein rotation about said first, second and third axis respectively denote 'yaw', 'roll' and 'pitch'.
6. An activity board assembly as claimed in any one of the preceding claims,
wherein lateral displacement of said upper end of the support member from
said first axis provides at least a component of rotational movement about the
10 second or third axes.
7. An activity board assembly as claimed in any one of the preceding claims,
wherein the resilient support member is formed from at least one of: a coil
spring; a unitary or laminate elastic rod; or any other object capable of bearing
the weight of a user mounted on the board without permanent deformation
15 whilst also being capable of resilient lateral displacement or bending at the
upper end under the effects of eccentric forces applied by the user about the
first axis.
8. An activity board assembly as claimed in any one of the preceding claims,
wherein the resilient support member is biased to return the board from a
20 displaced position to an equilibrium position with the said first axis vertically
aligned.
9. An activity board assembly as claimed in any one of the preceding claims,
wherein the resilient support member is adapted to allow linear movement of
the board along said first axis.
- 25 10. An activity board assembly as claimed in any one of the preceding claims,
further including a tilting mechanism interposed between the upper end of the

resilient support member and the lower surface of the board, capable of providing rotation about the second axis.

- 5 11. An activity board assembly as claimed in claim 10, wherein said tilting mechanism is at least one unitary elastic block mounted along the longitudinal board axis.
12. An activity board assembly as claimed in claim 10, wherein said tilting mechanism is a ball joint comprising a ball and ball socket, the ball being attached to the resilient support means and the ball socket being attached to the board or vice versa.
- 10 13. An activity board assembly as claimed in claim 10, wherein said tilting mechanism is at least one of: a hinge, universal joint, articulated member, or swivel device.
14. An activity board assembly as claimed in any one of claims 10-13, wherein said tilting mechanism incorporates a biasing means to bias the tilting means towards an equilibrium position with the board substantially level.
- 15 15. An activity board assembly as claimed in any one of claims 10-14, wherein permissible travel of the board about said second axis due to said tilting mechanism is restricted by stops equidistantly spaced about either side of the longitudinal board axis located on, or acting on the lower board surface.
- 20 16. An activity board assembly as claimed in claim 15, wherein said stops are at least partially resilient.
17. An activity board assembly as claimed in any one of claims 5-16, wherein the yaw rate for a given degree of user input is user-adjustable.
- 25 18. An activity board assembly as claimed in claim 17, wherein the yaw rate is user-adjustable by varying the degree of friction involved in rotating the board.

19. An activity board assembly as claimed in claim 17 or claim 18, wherein the yaw rate is adjustably limited by frictional contact with a screw bearing on said rotatable connection.
- 5 20. An activity board assembly as claimed in claim 17 or claim 18, wherein the yaw rate is adjustably limited by frictional contact with a bracket or jaws located about the shaft and capable of being adjustably tightened to restrict the yaw rate.
- 10 21. An activity board assembly as claimed in any one of the preceding claims, wherein the base portion has a laterally-enlarged ground-engaging lower surface and a central connecting member connected to the lower end of the resilient support member.
22. An activity board assembly as claimed in claim 21, further incorporating at least one wheel or roller assembly located on said base portion ground-engaging lower surface.
- 15 23. An activity board assembly as claimed in claim 22, wherein said wheels/rollers are detachable from the base portion.
24. A base portion for an activity board assembly as claimed in any one of claims 1-23, said base portion having a laterally-enlarged ground-engaging lower surface and a central connecting member connectable to the lower end of the resilient support member.
- 20 25. A base portion as claimed in claim 24, wherein said ground engaging lower surface is laterally enlarged with respect to the support member and extends orthogonally therefrom.
- 25 26. A base portion as claimed in claim 24 or claim 25, wherein the base portion includes a plurality of detachable, or retractable stabilizing legs, extending radially outwards from said central connecting member.

27. A base portion as claimed in claim 26, wherein said plurality of stabilizing legs extend radially outwards from said central connecting member for a length equal to or greater than the length of the resilient biasing member in said first axis.

5 28. A base portion as claimed in any one of claims 24 - 27, further incorporating at least one wheel or roller assembly located on said base portion ground-engaging lower surface.

29. A base portion as claimed in claim 28, wherein said wheels/rollers are detachable from the base portion.

10 30. A base portion as claimed in any one of claims 28 or claim 29, wherein said wheels/rollers are adjustably connected to the base portion between an engaged position, wherein the wheels are in direct contact with the ground surface, and a disengaged position, wherein the base portion is in direct contact with the ground surface, such that when in an engaged position, the
15 wheels support the activity board assembly.

31. An activity board assembly including;

- a board having an upper surface for supporting a user,
- a base portion and
- a support member having an upper and a lower distal end, said upper end
20 being connected to an underside of said board and said lower distal end being connected to said base portion,

characterised in that the board is rotatable with respect to the base portion about;

- a first axis in a plane substantially orthogonal with the upper surface of the
25 board and/or the base portion;

- a second axis substantially orthogonal to said first axis and substantially parallel to the upper surface of the board and/or the base portion;
- a third axis orthogonal to both the first and second axis;

said base portion being provided with one or more wheel or roller assemblies
5 on a lower surface.

32. An activity board assembly as claimed in claim 31, wherein the base portion may be formed with a plurality of leg portions disposed radially outwards from a central portion connected to the support member.

10 33. An activity board assembly as claimed in claim 31 or claim 32, wherein said wheel or roller assemblies are positioned towards the distal end of said legs.

34. An activity board assembly as claimed in any one of claims 31 - 33, wherein said legs are retractable and/or detachable.

15 35. An activity board assembly as claimed in any one of claims 31 - 34, wherein said wheels and/or roller assemblies are pivotally attached to said base portion, such that the wheel and/or roller assemblies are movable between a ground contacting position and a non ground contacting position.

20 36. An activity board assembly as claimed in any one of claims 1 - 35, further including at least one displacement assembly, located between said lower board surface and the resilient support member, said displacement assembly being configured to allow at least partially translational relative movement between the board and the resilient support member at least partially along, or parallel to the second and/or third axis.

25 37. An activity board assembly as claimed in claim 36, wherein said translational movement is constrained solely within a plane extending through both the first and third axes

38. An activity board assembly as claimed in claim 37, wherein said translational movement is constrained to movement substantially along the third axis.

39. An activity board assembly as claimed in any one of claims 36 - 38, wherein said translational movement is constrained along a path located substantially equidistantly either side of a central point positioned on said longitudinal second axis.

40. An activity board assembly as claimed in claim 39, wherein at least one displacement assembly is biased towards said central point by a biasing means.

41. An activity board assembly as claimed in claim 40, wherein the biasing means consists of a pair of compression springs orientated in a substantially opposed alignment within a track either side the second axis.

42. An activity board assembly as claimed in claim 41, wherein said track is partially curved laterally upwards and outwards from the longitudinal board axis.

43. An activity board assembly including;

- a board having an upper surface for supporting a user, a base portion;
- a resilient support member having an upper and a lower distal end, said upper end being connected to an underside of said board and said lower distal end being connected to said base portion, and
- at least one displacement assembly, located between said lower board surface and the resilient support member,

characterised in that the board is rotatable with respect to the base portion about;

- a first axis in a plane substantially orthogonal with the upper surface of the board and/or the base portion;
- a second axis substantially orthogonal to said first axis and substantially parallel to the upper surface of the board and/or the base portion;
- 5 - a third axis orthogonal to both the first and second axis;

said displacement assembly being configured to allow at least partially translational relative movement between the board and the resilient support member at least partially along, or parallel to the second and/or third axis.

10 44. An activity board assembly as claimed in claim 43, wherein said translational movement is constrained solely within a plane extending through both the first and third axes, and preferably being constrained to movement substantially along the third axis.

15 45. An activity board assembly as claimed in any one of claims 1-20 or 35-42, wherein said activity board assembly is adapted for constrained movement along an elongated guiding track.

46. An activity board assembly including;

- a board having an upper surface for supporting a user,
- a base portion, and
- 20 - a support member having an upper and a lower distal ends, said upper end being connected to an underside of said board and said lower distal end being connected to said base portion,

characterised in that the board is rotatable with respect to the base portion about;

- 25 - a first axis in a plane substantially orthogonal with the upper surface of the board and/or the base portion;

- a second axis substantially orthogonal to said first axis and substantially parallel to upper surface of the board and/or the base portion;
- a third axis orthogonal to both the first and second axis;

said base portion being adapted for constrained movement along an elongate guiding track.

47. An activity board assembly as claimed in claim 45 or claim 46, wherein said base portion includes a plurality of rolling members interposed between the base portion and the guiding track.

48. An activity board assembly as claimed in claim 46 or claim 47, wherein said lower surface of the base portion is configured to interface or at least partially surround at least an upper portion of said guiding track.

49. An activity board assembly as claimed in any one of claims 45 - 48, further provided with a brake mechanism for controlling the speed of the activity board assembly along said elongated guiding track.

50. An activity board assembly as claimed in claim 49, wherein said brake is hand-operated and acts to apply a frictional clamping action on said guiding track.

51. An activity board assembly as claimed in claim 49 or claim 50, wherein said brake is configured to act on one or more rolling members supporting the activity board assembly on the guiding track

52. An activity board assembly as claimed in any one of claims 45 - 51, further including at least two attachment members adapted to prevent the base portion from detaching from the guiding track.

53. An activity board assembly as claimed in claim 52, wherein said attachment members are rolling members attached to the base portion and in communication with a guiding channel on the guiding track.

54. An activity board system including an elongated guiding track and one or more activity board assemblies as claimed in any one of claims 45 - 53, said activity board assemblies being adapted for constrained movement along said elongated guiding track.
- 5 55. An activity board system as claimed in claim 54, wherein the elongate guiding track is configured as a continuous extrusion with an 'I', or 'T' shaped cross-section.
56. An activity board system as claimed in claim 54 or claim 55, wherein the guiding track is orientated with an at least partially inclined path.
- 10 57. An activity board assembly as claimed in any one of the previous claims, adapted to interface with a processor and a display.
58. An activity board system including an activity board assembly as claimed in claim 57 including a processor configured to be interfaced with a display.
- 15 59. An activity board system as claimed in claim 58, further including a sensor system capable of detecting the position and/or movement of the board and transmitting same to said processor and display.
60. An activity board system as claimed in claim 59, wherein the position and/or movement of the board is detected with respect to the base portion and/or the support member.
- 20 61. An activity board system as claimed in claim 59, wherein the position and/or movement of the board is detected with respect to a reference point positioned external to the activity board.
- 25 62. An activity board system as claimed in any one of claims 58 - 61, wherein the position and movement of the board are determined by sensors providing continuous feedback on the instantaneous position of the board, or specific points on the board.

63. An activity board system as claimed in any one of claims 58 - 61, wherein the position and movement of the board are determined by placing the board in a predetermined initial position and orientation, whereupon the subsequent positions/orientations are calculated from sensors providing feedback on the rate of movement about the first, second and third axis.

64. An activity board system as claimed in any one of claims 59-63, wherein said sensor system includes a combination of location sensors and movement sensors, configured such that feedback from the sensors is input to said processor and thereafter output to said display as a graphical representation of the board's position and movement.

65. An activity board system as claimed in claim 64, wherein said location sensors are positioned about the rotatable connection between the board and the support member to detect yaw

66. An activity board system as claimed in claim 65, further including location sensors positioned about the rotatable connection between the board and the support member to detect pitch stemming from movement of said tilting mechanism.

67. An activity board system as claimed in any one of claims 64-66, wherein said location sensors include at least one of;

- emitter and detector sensors positioned in complimentary configurations on the underside of the board and the base portion, wherein each detector is capable of determining the relative distance to a corresponding emitter;
- proximity sensors located in either the board or the base portion operating on a capacitive, inductive, or magnetic principles sensing the proximity between the board and base portion;

- spatial orientation sensors positioned in the board including gyroscopic, inertial, or mechanical tilt sensors independently measuring the effects of any linear or rotational movement of the board;
- active sensors including ultrasonic emitters and detector sensors located together on the underside of the board, whereby emissions from the transmitter are reflected from the ground and/or base portion and reflected back to the detector sensor;
- emitter and detector sensors positioned in complimentary configurations wherein a plurality of emitters are located on the board at predetermined locations and at least one receiver positioned externally from the board;
- and/or any combination of same

68. An activity board system as claimed in any one of claims 57 - 67, configured to detect movement of the user and to transmit the user's movement to the processor to generate a corresponding image of the user's movement on the display.

69. An activity board system as claimed in claim 68, wherein said user's movement is detected by detecting the position of one or more sensors or detectable patches applied or worn by the user.

70. An activity board assembly substantially as hereinbefore described, with respect to, and as shown in the drawings.

71. An activity board system substantially as hereinbefore described, with respect to, and as shown in the drawings.

72. A base portion for an activity board assembly substantially as hereinbefore described, with respect to, and as shown in the drawings.